PATENT ABSTRACTS OF JAPAN

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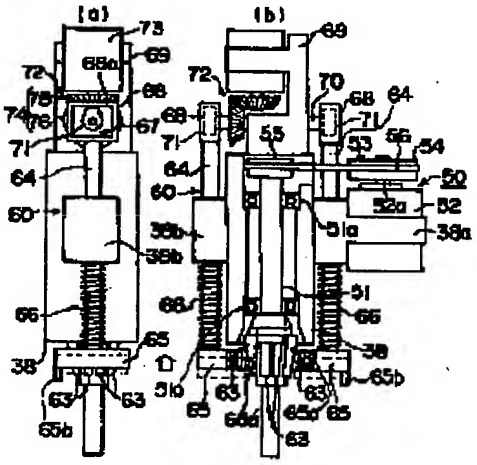
(54) LENS SMOOTHING AND POLISHING MACHINE

(57)Abstract:
PROBLEM TO BE SOLVED: To cope with various works by a monoaxial grinding wheel spindle by comprising at least a grinding tool for rough grinding or grinding tool for finishing, and comprising at least an monoaxial tool holding rotary shaft for holding the tool.
SOLUTION: To form a V-shaped hollow on a lens to be finished, ground into the ball shape, a grinding wheel for finishing is held on a grinding wheel spindle 51 of a tool holding mechanism 60 for a grinding wheel for rough grinding, a driving motor 52 is operated to transmit the rotation of the driving motor 52 to the tool rotary shaft 51 by rotating the power transmitting mechanism 53, and the grinding wheel for finishing is rotated and driven. In this condition, the driving motor 52 is operated and controlled by means of an operation control circuit on the basis of the edge thickness data, for finishing a peripheral edge of the lens to be finished by a peripheral part of the grinding wheel for finishing, and then the V-shaped hollow is formed by a V-shaped groove of the grinding wheel for finishing on the peripheral edge of the lens to be finished grounded into the ball shape.



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CLAIMS

[Claim(s)]
[Claim 1] Lens grinding process equipment characterized by preparing the tool maintenance axis of rotation of at least 1 shaft which arranges the grinding-stone tool for rough grinding, or the **** tool for finish grinding at least, and holds any one of the aforementioned tools in the lens grinding process equipment for carrying out the grinding process of the raw spectacle lens.
[Claim 2] Lens grinding process equipment characterized by preparing the tool maintenance axis of rotation of at least 1 shaft which arranges the grinding-stone tool for rough grinding, or the grinding-stone tool for finish grinding at least to the circumference of the shaft of the aforementioned lens axis of rotation, and holds any one of the aforementioned tools in the lens grinding process equipment for carrying out the grinding process of the raw spectacle lens pinched by the lens axis of rotation.
[Claim 3] Lens grinding process equipment for carrying out the grinding process of the raw spectacle lens pinched by the lens axis of rotation characterized by carrying out the grinding process of the periphery section of the aforementioned spectacle lens with the aforementioned tool which was equipped with the following, adjusted the wheel base of the aforementioned lens axis of rotation and the aforementioned tool maintenance axis of rotation, and was held at the aforementioned tool maintenance axis of rotation. The installation base which lays the grinding-stone tool for rough grinding, or the grinding-stone tool for finish grinding in the circumference of the aforementioned lens axis of rotation at least. The tool maintenance axis of rotation of at least 1 shaft holding any one of the aforementioned tools.
[Claim 4] Lens grinding process equipment with which it is lens grinding process equipment into which it hits, making a spectacle lens rotate the tool which the tool maintenance axis of rotation holds, and this spectacle lens is processed, and the aforementioned tool is made to correspond to various kinds of processings, more than one are arranged, and the aforementioned tool maintenance axis of rotation is characterized by holding automatically [the aforementioned tool / any one] according to the kind of processing.
[Claim 5] Lens grinding process equipment according to claim 4 characterized by having prepared the lens axis of rotation which can be rotated in order to turn to the tool with which the aforementioned spectacle lens is pinched and the aforementioned tool maintenance axis of rotation holds the processed section of this spectacle lens, and having arranged the aforementioned tool to the circumference of the shaft of this lens axis of rotation.
[Claim 6] Lens grinding process equipment according to claim 5 carry out that the aforementioned drive motor carries out a rotation drive in the aforementioned installation base as the feature so that the installation base for laying the aforementioned tool in the circumference of the shaft of the aforementioned lens axis of rotation in a circle may be prepared, the drive motor which carries out the rotation drive of the aforementioned lens axis of rotation may be formed and it may be easy for the aforementioned tool maintenance axis of rotation to hold the tool which should be held.
[Claim 7] Lens grinding process equipment according to claim 1 to 6 characterized by having arranged the KOBA thick configuration measurement tool for measuring the KOBA thick configuration of a spectacle lens.

[Claim 8] Lens grinding process equipment according to claim 1 to 6 characterized by having arranged the grinding-stone tool for rough grinding, the grinding-stone tool for finish grinding, the grinding-stone tool for chamfering-of-the-edge processing, the grinding-stone tool for mirror-plane processing, the grinding-stone tool for superfinishing grinding, the tool for punching, the tool for trench digging, and the cutter.

[Translation done.]

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[The technical field to which invention belongs] this invention relates to the lens grinding process equipment into which the periphery section of a spectacle lens is processed.
[0002]
[Description of the Prior Art] From the former, as shown, for example in JP,9-253999,A and JP,9-254000,A, two or more grinding stones which carry out the grinding of the spectacle lens are arranged, and the lens grinding process equipment into which a lot of spectacle lenses are processed for a short time is known.
[0003]
[Problem(s) to be Solved by the Invention] However, with the lens grinding process equipment mentioned above, the grinding stone only for the processings must be added to a wheel spindle existing whenever the kind of processing increases, or a wheel spindle must newly be prepared, and while a drive becomes complicated, the problem which the whole equipment enlarges occurs.

[0004] Moreover, when processing the spectacle lens corresponding to a rim loess frame, a wireframe, etc. which lost the lens frame of a spectacles frame in recent years, you have to arrange a new wheel spindle separately similarly.
[0005] In addition, to realize the good arris grinding process of the appearance corresponding to the configuration of a KOBA side by adding the KOBA thick configuration measurement function which can measure the configuration of the KOBA side of a spectacle lens to conventional lens grinding process equipment was desired.
[0006] Then, the 1st purpose of the invention in this application is to offer the lens grinding process equipment which prepared the maintenance axis of rotation held possible [exchange of the arranged wheel-spindle tool] to make various processings realize.
[0007] Moreover, the 2nd purpose of this invention is also arranging the KOBA thick configuration measurement tool for measuring the configuration of KOBA ** of a spectacle lens, and sharing the maintenance axis of rotation, and it is to offer the lens grinding process equipment which can also measure a KOBA thick configuration simultaneously, without preparing the driving shaft of exclusive use.
[0008]
[Means for Solving the Problem] Then, in order to attain the 1st purpose of the above, in the lens grinding process equipment for carrying out the grinding process of the raw spectacle lens, invention of a claim 1 arranges the grinding-stone tool for rough grinding, or the **** tool for finish grinding at least, and is characterized by preparing the tool maintenance axis of rotation of at least 1 shaft holding any one of the aforementioned tools.
[0009] Moreover, in the lens grinding process equipment for carrying out the grinding process of the raw spectacle lens pinched by the lens axis of rotation, invention of a claim 2 arranges the grinding-stone tool for rough grinding, or the grinding-stone tool for finish grinding at least to the circumfer nce of the shaft of the aforementioned lens axis of rotation, and is characterized by preparing the tool maintenance axis of rotation of at least 1 shaft holding any one of the

aforementioned tools.
[0010] Furthermore, invention of a claim 3 sets the raw spectacle lens pinched by the lens axis of rotation to the lens grinding process equipment for carrying out a grinding process. The installation base which lays the grinding-stone tool for rough grinding, or the grinding-stone tool for finish grinding in the circumference of the aforementioned lens axis of rotation at least, It is characterized by carrying out the grinding process of the periphery section of the aforementioned spectacle lens with the aforementioned tool which has the tool maintenance axis of rotation of at least 1 shaft holding any one of the aforementioned tools, adjusted the wheel base of the aforementioned lens axis of rotation and the aforementioned tool maintenance axis of rotation, and was held at the aforementioned tool maintenance axis of rotation.
[0011] Moreover, invention of a claim 4 is lens grinding process equipment into which it hits, making a spectacle lens rotate the tool which the tool maintenance axis of rotation holds, and this spectacle lens is processed, the aforementioned tool is made to correspond to various kinds of processings, more than one are arranged, and the aforementioned tool maintenance axis of rotation is characterized by holding automatically [the aforementioned tool / any one] according to the kind of processing.
[0012] Furthermore, in the lens grinding process equipment of a claim 4, invention of a claim 5 prepares the lens axis of rotation which can be rotated in order to turn to the tool with which the aforementioned spectacle lens is pinched and the aforementioned tool maintenance axis of rotation holds the processed section of this spectacle lens, and is characterized by having arranged the aforementioned tool to the circumference of the shaft of this lens axis of rotation.
[0013] Moreover, it carries out that the aforementioned drive motor carries out a rotation drive in the aforementioned installation base as the feature so that invention of a claim 6 may prepare the installation base for laying the aforementioned tool in the circumference of the shaft of the aforementioned lens axis of rotation in a circle in the lens grinding process equipment of a claim 5, the drive motor which carries out the rotation drive of the aforementioned lens axis of rotation may be prepared and it may be easy for the aforementioned tool maintenance axis of rotation to hold the tool which should be held.
[0014] In order to attain the 2nd purpose of the above, invention of a claim 7 is characterized by having arranged the KOBA thick configuration measurement tool for measuring the KOBA thick configuration of a spectacle lens in the lens grinding process equipment of either a claim 1 or the claim 6.
[0015] Moreover, invention of a claim 8 is characterized by having arranged the grinding-stone tool for rough grinding, the grinding-stone tool for finish grinding, the grinding-stone tool for chamfering-of-the-edge processing, the grinding-stone tool for mirror-plane processing, the grinding-stone tool for superfinishing grinding, the tool for punching, the tool for trench digging, and the cutter in the lens grinding process equipment of either a claim 1 or the claim 6.
[0016]
[Embodiments of the Invention] Hereafter, this invention is explained based on a drawing.
<1st example [composition]> drawing 1 shows the whole lens grinding process equipment composition concerning this invention.
[0017] In drawing 1 , 1 is a wrap case about the whole equipment, and this case 1 consists of a bottom wall (base) 2, a side attachment wall (lateral portion) 3, 3', and a ceiling wall (upper wall) 4.
[0018] The lens axis of rotation 5 (refer to drawing 6 and drawing 7) which penetrates a bottom wall 2 perpendicularly up and down, the tool magazine (tool stowage) 6 prepared in the lens axis of rotation 5, and the rotation driving gear 7 which carries out the rotation drive of the lens axis of rotation 5 approach a side attachment wall 3, and is formed in this bottom wall 2.
<Tool magazine 6> this tool magazine 6 The circular base board 8 which was located on the bottom wall 2 and formed in the lens axis of rotation 5 at one (circular rotary table which is an installation base (disk)), The cylinder-like side attachment wall 9 attached along with the flank of the base board 8 and a center section are held that relative rotation is possible and airtightly at the lens axis of rotation 5, and it has the wrap umbrella-like lid 10 for the upper limit of the cylinder-like side attachment wall 9 (drawing to the expedi nt upper airtight of explanation, it is

not illustrating.). . Opening 10a is prepared in this umbrella-like lid 10, and this opening 10a is closed by covering device material 10b made of rubber. Although the infeed is prepared in the radial from the center at covering device material 10b as shown in drawing 26 , permeation to the tool magazine 6 interior of the grinding water at the time of processing is prevented. Moreover, notch 10c is formed in the marginal part of the umbrella-like lid 10 corresponding to opening 10a.

[0019] The tool attachment components a1-a9 according to two or more tool configurations arranged in pitches [hoop direction] on this base board 8 are attached in the position shown in the stage S1 of drawing 4 - S9. In this example, a tool attachment component can also make [more] this arrangement than this, although arranged at nine places of a1-a9.

[0020] a9 is arranged focusing on the lens axis of rotation 5, and can hold the tool attachment component a1 - various tool [which was shown in drawing 3] (i) - (v).

(i) — the rough grinding tool b which is a grinding-stone tool for surface grinding — this rough grinding tool b has the rough grinding grinding stone b1 which is a grinding-stone tool for surface grinding, the rough grinding tool b2 of an option, and b3 grade The cutter for rough grinding is used for the rough grinding tool b2. The rough grinding tool b3 has a granular grinding-stone portion in contact with a lens so that it may be used for the ground lens of special composition, such as a polycarbonate, and the polycarbonate etc. may not be melted with the heat produced during a grinding process. Moreover, the trench-digging tool b4 which prepared the trench-digging processing section at the nose of cam of the rough grinding grinding stone b1 is prepared.

(ii) — the processing tool c — this processing tool c has the finish grinding grinding-stone (finish grinding grinding-stone tool) c4 grade of the option which are the finish grinding grinding stone c1 with the annular V groove for arris processing (finish grinding grinding-stone tool), the finish grinding grinding stone c2 with a recessing projected part (finish grinding grinding-stone tool), the drill c3 that is a tool for punching, and a grinding-stone tool for chamfering-of-the-edge processing

[0021] The finish grinding grinding stone c1 has the pillar section which has the peripheral surface section for flat-surface finish, and an annular V groove for arris processing. The finish grinding grinding stone c2 has the pillar section which has the peripheral surface section for flat-surface finish, and an annular projected part for slot finish. The finish grinding grinding stone c4 has the pillar section which has the peripheral surface section for flat-surface finish, an annular V groove for arris processing, and the taper side for chamfering-of-the-edge processing established in the point.

(iii) the polish grinding stone (polish tool) d which is a grinding-stone tool for mirror-plane processing — this polish grinding stone d has the polish grinding stone d1 for arris polish processing with a V groove, and the polish grinding-stone d2 grade for slot polish with a projected part

[0022] The polish grinding stone d1 has the pillar section which has the peripheral surface section for flat-surface polish processing, and an annular V groove for arris polish processing. The polish grinding stone d2 has the pillar section which has the peripheral surface section for flat-surface polish processing, and an annular projected part for slot polish processing.

(iv) The super-polish grinding-stone (super-polish tool) e super-polish grinding stone e which is a super-mirror-plane processing grinding-stone tool (grinding-stone tool for superfinishing grinding processes) has the super-[with a V groove] polish grinding stone e1 for arris super-polish, and the super-[with a projected part] polish grinding-stone e2 grade for **** polish.

[0023] The super-polish grinding stone e1 has the pillar section which has the peripheral surface section for flat-surface super-polish processing, and an annular V groove for arris super-polish processing. The super-polish grinding stone e2 has the pillar section which has the peripheral surface section for flat-surface super-polish processing, and an annular projected part for **** polish processing.

(v) The tool attachment component holding the rough grinding grinding stone b1, the rough grinding tools b2, b3, and b4 of an option, the finish grinding grinding stone c1, the finish grinding grinding stone c2, a drill c3, the finish grinding grinding stone c4 of an option, the polish grinding

stone d1, the polish grinding stone d2, the super-polish grinding stone e1, and super-polish grinding-stone e2 grade which is the KOBA thick configuration measurement tool f of a spectacle lens is formed in the shape of a cylinder. And the rough grinding grinding stone b1, the rough grinding tools b2, b3, and b4 of an option, the finish grinding grinding stone c1, the finish grinding grinding stone c2, a drill c3, the finish grinding grinding stone c4 of an option, the polish grinding stone d1, the polish grinding stone d2, the super-polish grinding stone e1, and super-polish grinding-stone e2 grade are fitted in the tool attachment component of the shape of this cylinder free [****] from the upper part. Furthermore, the KOBA thick configuration measurement tool f is fitted in the tool attachment component which has the retention groove (not shown) opened up possible [****].

[0024] Follow, for example, the KOBA thick configuration measurement tool f of a raw spectacle lens (**-ed lens L) is made to hold to the tool attachment component a1 of a stage S1. The rough grinding grinding stones (rough grinding grinding-stone tool) b1 and b2 and b3 grade are made to hold to the tool attachment component a2 of a stage S2. The finish grinding grinding stone c1 which is a tool for arris processing, or c4 is made to hold to the tool attachment component a3 of a stage S3. The polish grinding stone d1 which is a tool for arris processing is made to hold to the tool attachment component a4 of stage S4. The super-polish grinding stone e1 which is a tool for arris processing is made to hold to the tool attachment component a5 of a stage S5. The drill c3 which is a tool for punching is made to hold to the tool attachment component a6 of a stage S6. The finish grinding grinding stone c2 which is a trench-digging cutter is made to hold to the tool attachment component a7 of a stage S7. The polish grinding stone d2 which is a trench-digging cutter is made to hold to the tool attachment component a8 of a stage S8, and it is made to make the super-polish grinding stone e2 which is a trench-digging cutter hold to the tool attachment component a9 of stage S9. In addition, in drawing 1 , drawing 6 , and drawing 7 , for convenience, although arrangement of the tool attachment components a2 and a3 in the tool magazine (tool stowage) 6 is shown in the position shifted 180 degrees of explanation, it is located next like drawing 4 in fact.

[0025] Moreover, bearing 11 is infixed between the base board 8 and the bottom wall 2, and bearing 11 holds the base board 8 and the lens axis of rotation 5 free [rotation] to the bottom wall 2.

The <rotation driving gear 7> rotation driving gear 7 has the driving force means of communication (driving force transfer mechanism) 13 which makes rotation of the drive motor (electric driving means) 12 attached in the undersurface of a bottom wall 2 through the bracket which is not illustrated and a drive motor 12 transmit to the lens axis of rotation 5. This driving force transfer mechanism 13 has the follower gear 15 which is attached in the drive gear 14 attached in output-shaft 12a of a drive motor 12, and the soffit section of the lens axis of rotation 5, and gears on the drive gear 14. By this composition, if a drive motor 12 is operated, rotation of a drive motor 12 will be transmitted to the lens axis of rotation 5 through gears 14 and 15.

Lens clamp equipment 20 is attached in the <clamp equipment 20> side attachment wall 3. The base 21 where this lens clamp equipment 20 was fixed in the center of the vertical direction of the inside of a side attachment wall 3 (clamp work base), The delivery screw 22 with which the vertical edge was held free [rotation] at the projected parts 21a and 21a which turned up and down, and were arranged perpendicularly, and were prepared in the upper and lower sides of the point of the base 21, The drive motor 23 which is fixed on the base 21, sends and carries out the rotation drive of the screw 22 (clamp work driving gear), It has the lens axis of rotation (work maintenance shaft) 25 attached in the slider (clamp work attachment component) 24 with which it sends to the female screw section which is prolonged up and down, and which is not illustrated, and screwing insertion of the screw 22 is carried out, and the slider 24.

[0026] This slider 24 has the key (not shown) which engages with the slot which is prolonged in th upp r and lower sides prepared in the base 21, and which is not illustrated, and has come to be able to carry out vertical movement, without rotating to the circumference of the axis of the delivery screw 22. Moreover, a slider 24 has bending section 24b which inclines slightly [a side attachment wall 3] in an opposite-side lower part in the soffit section of perpendicular section

24a and perpendicular section 24a, and is prolonged in it. And the lens axis of rotation (work maintenance shaft) 25 to which the point of bending section 24b is made to counter by the upper limit of the lens axis of rotation 5, and counters the point of this bending section 24b at the upper limit of the lens axis of rotation 5 is held. this lens axis of rotation 25 — the lens axis of rotation 5 and the same axle — and it is held free [the rotation to the circumference of an axis] at bending section 24b In addition, the tool move space 26 is formed above bending section 24b.

[0027] By rotating normally or reversing a drive motor 23, the delivery screw 22 is rotated normally or reversed, a slider 24 sends, it is moved up and down with a screw 22 by this composition, and the lens axis of rotation 25 is moved to a Z direction (the vertical direction). In addition, a clamp work is a lens maintenance shaft for holding the raw spectacle lens which is a work here.

The tool move equipment 30 for moving a clamp tool (tool pinching axis of rotation) to the direction (longitudinal direction in drawing 1) of Y and a Z direction is formed in the ceiling section 4 of the <tool move equipment 30> case 1. Here, in order that a clamp tool may carry out KOBA thick configuration measurement of the raw spectacle lens of a work, it pinches the various tools for carrying out a grinding process, and is a shaft for making it rotate.

[0028] The base 31 where this tool move equipment 30 was attached in the inferior surface of tongue of the ceiling wall 4, The direction delivery screw 32 of Y with which both ends were held free [rotation] at the projected parts 31a and 31b which were prolonged towards the direction of Y and prepared in the right-and-left edge of the base 31, It has the direction slider 34 of Y which it is held at the drive motor (driving means) 33 which is fixed to the base 31 with the bracket which is not illustrated, and carries out the rotation drive of the direction delivery screw 32 of Y, and the direction delivery screw 32 of Y, and is driven in the direction of Y by rotation of the direction delivery screw 32 of Y. An attitude drive only in the direction of Y is possible for this slider 34, without rotating to the circumference of the axis of the delivery screw 32 by a key seat, a key, etc. which are not illustrated. Therefore, move control of the direction slider 34 of Y is carried out at a left or the method of the right by rotating normally or reversing a drive motor 33, and rotating normally or reversing the delivery screw 32.

[0029] Moreover, the Z direction delivery screw 35 with which tool move equipment 30 was turned up and down, it was perpendicularly arranged and the vertical edge was held free [rotation] at the direction slider 34 of Y, The drive motor 36 held at the direction slider 34 of Y, and the power transmission device 37 which transmits rotation of a drive motor 36 to the Z direction delivery screw 35 (power means of communication), It has the Z direction slider 38 by which is held at the Z direction delivery screw 35, and a move drive is carried out by rotation of the Z direction delivery screw 35 at a Z direction. The attitude drive only to a Z direction is possible for this slider 38, without rotating to the circumference of the axis of the delivery screw 35 by a key seat, a key, etc. which are not illustrated. A power transmission device 37 has the timing belt 41 ****(ed) by the timing pulley (drive pulley) 39 fixed to output-shaft 36a of a drive motor 36, the timing pulley (follower pulley) 40 fixed to the upper-limit section of the Z direction delivery screw 35, and pulleys 39 and 40.

[0030] By rotating normally or reversing a drive motor 36 by this composition, normal rotation or an inversion of a drive motor 36 is transmitted to the Z direction delivery screw 35 through the timing pulley 39, a timing belt 41, and the timing pulley 40, the Z direction delivery screw 35 is rotated normally or reversed, and the Z direction slider 38 is moved to the upper part or a lower part by rotation of this Z direction delivery screw 35.

[0031] Furthermore, tool move equipment 30 has the tool rotation drive 50 (refer to drawing 2) formed in the Z direction slider 38, and the tool maintenance mechanism 60 (refer to drawing 1 and drawing 2) in which the tool which carries out a rotation drive with the tool rotation drive 50 is made to hold. The Z direction slider 38 has projected parts 38a and 38b in a flank.

The <tool rotation drive 50> tool rotation drive 50 has bearing 51a fixed in the Z direction slider 38, the tool driving shaft 51 which turned up and down, was arranged perpendicularly and held free [rotation] at bearing 51a, the drive motor (driving means) 52 fixed to projected part 38a, and the power transmission device (power means of communication) 53 which transmits rotation

of a drive motor 52 to the tool driving shaft 51.
[0032] This power transmission device 53 has the belt 56 over which the drive pulley 54 fixed to output-shaft 52a of a drive motor 52, the follower pulley 55 fixed to the upper-limit section of the tool axis of rotation 51, and pulleys 54 and 55 were built.
[0033] By this composition, if a drive motor 52 is operated, rotation of a drive motor 52 will be transmitted to the tool driving shaft 51 through the drive pulley 54, a belt 56, and the follower pulley 55.
the clamp held at the soffit section of the tool axis of rotation 51 as the <tool maintenance mechanism 60> tool maintenance mechanism 60 was shown in drawing 5 — it has a member 61 this clamp — a member 61 is equipped with the so-called clamp mechanism of a collet-chuck method, and has two or more elastic maintenance presser foot stitch tongues (elastic clamp presser foot stitch tongue) 63 formed in the cylinder part 62 held free [rotation] at the soffit section of the tool axis of rotation 51, and the soffit section of a cylinder part 62 in pitches [hoop direction] They form the taper side of the shape of a tapering cone as the superficies of two or more of these elastic maintenance presser foot stitch tongues 63 go caudad.
[0034] moreover, the presser-foot-stitch-tongue press attached in the soffit section of the clamp shafts 64 and 64 held the tool maintenance mechanism 60 penetrates the projected parts 38a and 38b of the Z direction slider 38 up and down, and free [the vertical movement to projected parts 38a and 38b], and the clamp shafts 64 and 64 — it has a member 65 this presser-foot-stitch-tongue press — the member 65 is equipped with bearing 65a, and presser-foot-stitch-tongue press side 65a' prolonged in a hoop direction in accordance with the superficies of two or more elastic maintenance presser foot stitch tongues 63 is prepared inside bearing 65a
[0035] furthermore, the tool maintenance mechanism 60 is wound around the clamp shafts 64 and 64 — having — and projected parts 38a and 38b and presser-foot-stitch-tongue press — it has the compression coil springs 66 and 66 infixed between members 65, and the axial driving means (press a member driving means) 67 which carry out the move drive of the clamp shafts 64 and 64 up and down presser-foot-stitch-tongue press — engagement pin 65b which projects caudad protrudes on the marginal part of a member 65 This engagement pin 65b is made to be engaged before the exchange work of a tool by notch 10c of the umbrella-like lid 10.
[0036] The quadrats 68 and 68 by which the axial driving means 67 were formed in the upper limit of the clamp shafts 64 and 64 at one, The supporter material 69 attached in the upper-limit section of the Z direction slider 38, and the interlocking shaft 70 held free [rotation] at the supporter material 69, It has the cams 71 and 71 which are fixed to the both ends of the interlocking shaft 70, and engage with the inferior surface of tongue of the upper walls 68a and 68a of the quadrats 68 and 68 of the clamp shafts 64 and 64, and the axial driving means 72 which carry out the rotation drive of the interlocking shaft 70.
[0037] The axial driving means 72 have the drive motor 73 fixed to the supporter material 69, and the power transmission device 74 which transmits rotation of a drive motor 73 to the interlocking shaft 70. This power transmission device 74 has the bevel gear (follower gear) 76 which is fixed to the interlocking shaft 70 with the bevel gear (drive gear) 75 fixed to output-shaft 73a of a drive motor 73, and gears to a bevel gear 75.
[0038] By this composition, rotation of a drive motor 73 is transmitted to cams 71 and 71 through bevel gears 75 and 76 and the interlocking shaft 70.
The <tool rotational structure> Each tool b1 grade of drawing 3 mentioned above is equipped with cylinder part 80' prepared in the upper-limit section of the main part 80 of a tool, and the main part 80 of a tool as shown in drawing 5 . and this tool b1 grade — presser-foot-stitch-tongue press — the cylinder part 80' is held with the elastic maintenance presser foot stitch tongue 63 pressed by the member 65 (pinching)
[0039] As mentioned above, rotation of the drive motor 52 transmitted through the drive pulley 54, PERUTO 56, and the follower pulley 55 is transmitted to the tool axis of rotation 51, and is told to the elastic maintenance presser foot stitch tongue 63 formed at the nose of cam of the tool axis of rotation 51.
[0040] the tool axis of rotation 51 is held by bearing 51a — having — the elastic maintenance

presser foot stitch tongue 63 — presser-foot-stitch-tongue press — since it is held by bearing 65a prepared in the member 65, a cylinder part 62 and the elastic maintenance presser foot stitch tongue 63 are united, and are rotated, and rotation of a drive motor 52 is transmitted to direct tool b1 grade

[0041] in addition, the bushing section which can rotate freely in the upper-limit section of the main part 80 of a tool — preparing — the upper limit of the main part 80 of a tool, and the soffit of the tool axis of rotation 51 — the bushing section — a clamp — when held at a member 61, rotation of a drive motor 52 can also be transmitted to tool b1 grade by forming the clutch gear tooth which is annularly arranged by the hoop direction and gears mutually

<the KOBA thick configuration measurement tool f> — the KOBA thick configuration measurement tool (touch sensor) f as this KOBA thick measurement means was shown in drawing 6 — as — a clamp — it has the measurement head 91 prepared in the shank 90 made to pinch among two or more elastic maintenance presser foot stitch tongues 63 of a member 61 (maintenance), and the shank 90

[0042] This measurement head 91 has a shank 90, the box 92 established in one, and the contact attachment component 93. This contact attachment component 93 is prolonged up and down, and is formed in the box 92 in the shape of an abbreviation KO character from the horizontal levels 93b and 93c mutually formed in parallel successively by the portion of the upper and lower sides of perpendicular section 93a held possible [vertical movement] and perpendicular section 93a towards this direction. To the pars intermedia of perpendicular section 93a, an interval is set up and down, and flanges f1 and f2 are formed.

[0043] Moreover, the measurement head 91 has the move detection means 98 infixed between the coil spring 94 infixed between upper wall 92a of a box 92, and the flange f1, the coil spring 95 infixed between low wall 92b of a box 92, and the flange f2, contact 96 and 97 attached in the point of horizontal levels 93b and 93c towards a lower part and the upper part, respectively, and the contact attachment component 93 and a box 92.

[0044] This move detection means 98 has a detection means 99 for it to be attached in move sensor 98a prepared in the center of perpendicular section 93a of the contact attachment component 93 at one, and the center of abbreviation in a box 92, and to detect movement of move sensor 98a magnetically or electrically. The output from this detection means 99 is inputted into sending-circuit 99a, and the output signal from this sending-circuit 99a is transmitted through radio through antenna 99b (refer to drawing 8).

<Control circuit> The sending signal from antenna 99b mentioned above is received by the receiving circuit 101 through an antenna 100, as shown in drawing 8 , and the output from this receiving circuit 101 is inputted into the operation control circuit 102. Moreover, this operation control circuit 102 carries out drive control of drive motors 12, 23, 36, and 52 and the 73 grades. A stepping motor is used for these drive motors 12, 23, 36, and 52 and 73 grades.

[0045] furthermore — the operation control circuit 102 — ball type configuration data (thetai, rhoi) [from the frame configuration measuring device 103 — i= 0, and 1, 2 and 3 ... n] is inputted Moreover, ON signal from the lens maintenance switch 105 which carries out the normal rotation drive of the drive motor 23, and drops a slider 24, ON signal from the lens maintenance canceling switch 106 which carries out the inversion drive of the drive motor 23, and raises a slider 24, and the mode selection signal from the mode selection switch 107 are inputted into the operation control circuit 102. The memory (a record means or storage means) by which 108 was connected to the operation control circuit 102, and 109 are display (display means), such as a liquid crystal display connected to the operation control circuit 102.

An operation of [Function], next the spectacle lens grinding process equipment of such composition is explained. in addition — although drawing 9 - drawing 15 are used on the occasion of explanation of this operation (refer to "the processing sequence of the lens processed [(ii)]") — illustration — a sign omits about the thing of details for convenience

(i) (Operation A) ball type configuration data input operation control circuit 102 of each part makes memory 108 memorize this inputted ball type configuration data, when ball type configuration data (thetai, rhoi), such as configuration data of the lens frame of right and left of a spectacles frame, and a template, configuration data of a model lens, are inputted from the frame

configuration measuring device 103.
(B) If the lens maintenance canceling switch 106 is made to turn on, maintenance and the operati n control circuit 102 of a processed lens carry out the inversion drive of the drive motor 23, make the delivery screw 22 rotate reversely, will raise a slider 24 to the topmost part, and will stop it. In this state, since the upper limit of the lens axis of rotation 5 and the soffit of the lens axis of rotation 25 are open, the processed lens (a circular raw lens, i.e., a ground lens) L which adsorbed the adhesive disk Q made of rubber (adsorption cup) as shown in drawing 27 can be set to the upper-limit section of the lens axis of rotation 5. The lens maintenance switch 105 is turned on after this set. Thereby, the operation control circuit 102 carries out the normal rotation drive of the drive motor 23, rotates the delivery screw 22 normally, carries out specified quantity descent of the slider 24, and forces the soffit section of the lens axis of rotation 5 on the upper surface of the processed lens L by the predetermined pressure. By this, the processed lens L will be pinched between the lens axis of rotation 5 and 25 (drawing 28).
(C) Operate the mode selection switch 107, looking at tool selection, next display 109, and choose RENZUKOBA thick measurement mode, grinding tool selection mode, etc. which were displayed on display 109.
[0046] Here, the rough grinding grinding stone b1 is held among two or more elastic maintenance presser foot stitch tongues 63 of the tool maintenance mechanism 60, the thing which made the KOBA thick configuration measurement tool f of a spectacle lens hold among two or more tool attachment components a1-a9 on the base board 8 is a1, it is the case where the tool attachment component of this rough grinding grinding stone b1 is a2, and when RENZUKOBA thick measurement mode is chosen, tool exchange control of an about is explained.
[0047] The operation control circuit 102 carries out operation control of the drive motor 12, rotates the lens axis of rotation 5, and makes one rotate the base board 8, the cylinder-like side attachment wall 9, and the umbrella-like lid 10 by selection in this RENZUKOBA thick measurement mode. Under the present circumstances, operation control of a drive motor 12 is performed by the driving pulse until notch 10c of the umbrella-like lid 10 is located in the drawing 1 Nakamigi edge (like drawing 4 (a) and (b) right end). And when notch 10c of the umbrella-like lid 10 is located in the drawing 1 Nakamigi edge (like drawing 4 (a) and (b) right end), the operation of a drive motor 12 is stopped.
[0048] Then, the operation control circuit 102 carries out drive control, sends a drive motor 33, rotates a screw 32, carries out move control of the direction slider 34 of Y in the direction of drawing 1 Nakamigi, moves engagement pin 65b on the right of the umbrella-like lid 10, and stops a drive motor 33.
[0049] After this halt, the operation control circuit 102 carries out operation control of the drive motor 36, sends rotation of a drive motor 36 through the timing pulley 39, a timing belt 41, and the timing pulley 40, is made to transmit it to a screw 35, and drops the Z direction slider 38 by rotation of the delivery screw 35 in this case. The operation control circuit 102 is made to perform descent control of this Z direction slider 38 until the soffit section of engagement pin 65b is located in the side of notch 10c. And after the operation control circuit 102 carries out move control of the direction slider 34 of Y leftward in drawing 1 and makes engagement pin 65b engage with notch 10c by carrying out drive control, sending a drive motor 33, and rotating a screw 32, it stops a drive motor 33.
[0050] Next, the operation control circuit 102 carries out operation control of the drive motor 12, rotates the lens axis of rotation 5, and makes one rotate the base board 8 and the cylinder-like side attachment wall 9. And the operation control circuit 102 carries out operation control of the drive motor 12 until the tool attachment component a2 is located in drawing 1 and the drawing 4 (b) Nakamigi edge, and it makes opening 10a of the umbrella-like lid 10 face the tool attachment component a2. Next, the operation control circuit 102 inserts the rough grinding grinding stone b1 held at the tool maintenance mechanism 60 in which carried out move operation at the Z direction, and the slider 38 was formed in the slider 38 into the tool attachment component a2 through opening 10a while it carries out operation control of the drive motors 33 and 36 of tool move equipment 30 and carries out move operation of the slider 34 in the direction of Y. Under the present circumstances, although covering device material 10b is

prepared in opening 10a, this covering device material 10b is a product made of rubber, and since it has an infeed, it does not become the hindrance of passage of opening 10a of the tool maintenance mechanism 60.

[0051] Then, the operation control circuit 102 carries out operation control of the drive motor 73, and makes rotation of a drive motor 73 transmit to cams 71 and 71 through bevel gears 75 and 76 and the interlocking shaft 70. 90 degrees of cams 71 and 71 are rotated to the position it turned [position] to the longitudinal direction of (c) and (d) from the position the nose of cam turned [position] to the upper part of drawing 2 (a) and (b), and the variation rate of the quadrats 68 and 68 is carried out to a lower part according to the spring force of coil springs 66 and 66. thereby — the clamp shafts 64 and 64 and presser-foot-stitch-tongue press — a member 65 displaces below to quadrats 68 and 68 and one, the peripheral face of two or more elastic maintenance presser foot stitch tongues 63 which taper-like presser-foot-stitch-tongue press side 65a' formed in the tool maintenance mechanism 60 is deserted, and two or more elastic maintenance presser foot stitch tongues 63 desert the bushing section 80' peripheral face of the rough grinding grinding stone b1

[0052] And the operation control circuit 102 carries out move operation of the slider 38 at a Z direction while it carries out operation control of the drive motors 33 and 36 of tool move equipment 30 and carries out move operation of the slider 34 in the direction of Y, and it makes engagement pin 65b of the tool maintenance mechanism 60 engage with notch 10c of the umbrella-like lid 10.

[0053] The operation control circuit 102 carries out operation control of the drive motor 12, rotates the lens axis of rotation 5, makes one rotate the base board 8 and the cylinder-like side attachment wall 9, it carries out operation control of the drive motor 12 until the tool attachment component a1 is located in drawing 1 and the drawing 4 (b) Nakamigi edge, and it makes opening 10a of the umbrella-like lid 10 face the tool attachment component a1 and the KOBA thick configuration measurement tool f. And the operation control circuit 102 makes the shank 90 of the KOBA thick configuration measurement tool f insert among two or more elastic maintenance presser foot stitch tongues 63 of the tool maintenance mechanism 60 in which carried out move operation at the Z direction, and the slider 38 was formed in the slider 38 while it carries out operation control of the drive motors 33 and 36 of tool move equipment 30 and carries out move operation of the slider 34 in the direction of Y.

[0054] Then, the operation control circuit 102 carries out operation control of the drive motor 73, and makes rotation of a drive motor 73 transmit to cams 71 and 71 through bevel gears 75 and 76 and the interlocking shaft 70. 90 degrees is rotated to the position it turned [position] to the (a) and (b) top from the position the nose of cam turned [position] cams 71 and 71 to the side of drawing 2 (c) and (d), the spring force of coil springs 66 and 66 is resisted, and the upper part is made to carry out the variation rate of the quadrats 68 and 68. thereby — the clamp shafts 64 and 64 and presser-foot-stitch-tongue press — a member 65 displaces up to quadrats 68 and 68 and one, a pressure welding is carried out to the peripheral face of two or more elastic maintenance presser foot stitch tongues 63 which taper-like presser-foot-stitch-tongue press side 65a' formed in the tool maintenance mechanism 60, and two or more elastic maintenance presser foot stitch tongues 63 pinch the shank 90 of the KOBA thick configuration measurement tool f

[0055] And the operation control circuit 102 carries out move operation of the slider 38 at a Z direction while it carries out operation control of the drive motors 33 and 36 of tool move equipment 30 and carries out move operation of the slider 34 in the direction of Y, and it takes out up the KOBA thick configuration measurement tool f made to hold to the tool attachment component a1 through opening 10a with two or more elastic maintenance presser foot stitch tongues 63.

[0056] In this example, although explanation of exchange of a tool was explained about the rough grinding grinding stone b1 and the KOBA thick configuration measurement tool f, exchange of other tools is performed similarly.

(D) Based on the ball type configuration data (thetai, rhoi) memorized by memory 108, after KOBA thick measurement (measurement of an anterior refracting interface) and the operation

control circuit 102 of a processed lens make the KOBA thick configuration measurement tool f hold on the elastic maintenance presser foot stitch tongue 63 of the tool maintenance mechanism 60, when only the specified quantity rotates a drive motor 12, they rotate only the predetermined angle theta and stop the lens axis of rotation 5. This rotation is intermittently performed based on ball type configuration data (thetai, rhoi). In addition, S shows the ball type configuration based on ball type configuration data (thetai, rhoi) among drawing 4 (c).
[0057] Operation control is carried out based on n]. on the other hand — the operation control circuit 102 — the drive motor 33 of tool move equipment 30 — ball type configuration data (thetai, rhoi) [— i= 0, and 1, 2 and 3 ... After moving contact 97 of the KOBA thick configuration measurement tool f to the position of radius vector rhoi (i= 0, 1, 2, 3 ... n) in angle thetai (i= 0, 1, 2, 3 ... n), operation control of the drive motor 36 of tool move equipment 30 is carried out. Contact 97 of the KOBA thick configuration measurement tool f is made to contact the anterior refracting interface (drawing 6 drawing 1 , undersurface) of the processed lens L.
[0058] By this contact, move sensor 98a resists the spring force of a coil spring 95, and moves slightly. This movement is detected magnetically or electrically by the detection means 99, and this detecting signal is transmitted through antenna 99b from sending-circuit 99a. It is received by the antenna 100 and this transmitted detecting signal is inputted into the operation control circuit 102 through a receiving circuit 101. And if a detecting signal is received, while the operation control circuit 102 will stop the operation of a drive motor 36, it asks for the move position Zi (i= 0, 1, 2, 3 ... n) from the number of control pulses of a drive motor 36 to the Z direction of contact 97 as a contact position to the processed lens L, and memory 108 is made to memorize it as an anterior refracting interface position Lf (theta i, rho i, Zi) of the processed lens L.
[0059] The position data of the Z direction of the posterior refracting interface (drawing 6 drawing 1 , upper surface) of the processed lens [in / ball type configuration data (thetai, rhoi) / similarly] L, (Measurement of a posterior refracting interface) That is, it asks for the contact position (move position) Zj (j= 0, 1, 2, 3 ... n) to the upper surface of the processed lens L of contact 96 in angle thetai of drawing 4 (c), and radius vector rhoi, and memory 108 is made to memorize the posterior refracting interface position Lb (theta i, rho i, Zj) of the processed lens L.

[0060] (KOBA thick operation of a processed lens) From the difference of the contact positions Zi and Zj of contact 97 and 96 in the ball type configuration data (thetai, rhoi) called for by doing in this way It asks for KOBA ** deltai (i= 0, 1, 2, 3 ... n) of the processed lens L in ball type configuration data (thetai, rhoi), and memory 108 is made to memorize this data for which it asked as KOBA thick data (thetai, rhoi, deltai).
(E) After it carries out the grinding process operation control circuit 102 of a processed lens in this way and it asks for the KOBA thick data (thetai, rhoi, deltai) of the processed lens L, it exchanges for the rough grinding grinding stone b1 the KOBA thick configuration measurement tool f made to hold in the tool maintenance mechanism 60. And the operation control circuit 102 carries out operation control of the drive motors 33 and 36 based on ball type configuration data (thetai, rhoi), as the dashed line showed, it carries out move control of the rough grinding grinding stone b1, carries out the grinding of the peripheral surface of the processed lens L to drawing 7 by the rough grinding grinding stone b1, and forms the processed lens L in it at the configuration based on ball type configuration data (thetai, rhoi).
[0061] Thus, when giving an arris to the processed lens L which carried out grinding to the ball type configuration, while replacing the finish grinding grinding stone c1 of drawing 3 with the rough grinding grinding stone b1 and making it hold in the tool maintenance mechanism 60, operate a drive motor 52, rotation of a drive motor 52 is made to transmit to the tool axis of rotation 51 through a power transmission device 53, and the rotation drive of the finish grinding grinding stone c1 is carried out. And based on KOBA thick data (thetai, rhoi, deltai), operation control of the drive motors 33 and 36 is carried out by the operation control circuit 102 in this state. After carrying out finish grinding of the periphery section of the processed lens L by which grinding was carried out to the ball type configuration in the peripheral surface section of the finish grinding grinding stone c1, an arris is made to form in the periphery section of the

processed lens L by which grinding was carried out to the ball type configuration in V slot of the finish grinding grinding stone c1. After grinding further the periphery section and the arris of this processed lens L in the peripheral surface section and V slot of the polish grinding stone d1, they are super-ground in the peripheral surface section and V slot of the super-polish grinding stone e1. Exchange of the grinding stones d1 and e1 in this case is performed like the above-mentioned KOBA thick configuration measurement tool f.

[0062] moreover, in forming the engagement slot for making the band for lens maintenance engaged in the peripheral surface of the processed lens L which carried out grinding to the ball type configuration as mentioned above While replacing the finish grinding grinding stone c2 of drawing 3 with the rough grinding grinding stone b1 and making it hold in the tool maintenance mechanism 60, operate a drive motor 52, rotation of a drive motor 52 is made to transmit to the tool axis of rotation 51 through a power transmission device 53, and the rotation drive of the finish grinding grinding stone c2 is carried out. And after carrying out finish grinding of the peripheral surface of the processed lens L by which carried out operation control of the drive motors 33 and 36 by the operation control circuit 102 based on KOBA thick data (thetai, rhoi, deltai), and grinding was carried out to the ball type configuration in this state in the peripheral surface section of the finish grinding grinding stone c2, an engagement slot is made to form in the peripheral surface of the processed lens L by which grinding was carried out to the ball type configuration by the projected part of the finish grinding grinding stone c2. After grinding the peripheral surface and engagement slot of this processed lens by the peripheral surface section and the projected part of the polish grinding stone d2, they are super-ground by the peripheral surface section and the projected part of the super-polish grinding stone e2. Exchange of the grinding stones d2 and e2 in this case as well as the above-mentioned KOBA thick configuration measurement tool f is performed.

[0063] Furthermore, when forming the screw hole for fixing a lens stop to the processed lens L which carried out grinding to the ball type configuration, while replacing the drill c3 of drawing 3 with the rough grinding grinding stone b1 and making it hold in the tool maintenance mechanism 60, operate a drive motor 52, rotation of a drive motor 52 is made to transmit to the tool axis of rotation 51 through a power transmission device 53, and the rotation drive of the drill c3 is carried out. And the screw hole for fixing a lens stop to the periphery section of the processed lens L by which carried out operation control of the drive motors 33 and 36 by the operation control circuit 102, and grinding was carried out to the ball type configuration in this state is made to form.

(ii) Processing sequence (1) arris processing mode of a processed lens (Bevel MODE)

If arris ** EMODO (Bevel MODE) is chosen with the mode selection switch 107, the operation control circuit 102 will give arris processing to the KOBA edge of the processed lens L according to the processing sequence shown in drawing 9 .

[0064] That is, if this mode is chosen, the operation part control circuit 102 will perform KOBA thick measurement of the above-mentioned processed lens of (D) based on ball type configuration data (thetai, rhoi) with the KOBA thick configuration measurement tool f. In this case, after measuring the anterior refracting interface of drawing 9 (a), the posterior refracting interface of drawing 9 (b) is measured.

[0065] After this measurement is completed, it carries out the grinding process of the processed lens L to a ball type configuration by the rough grinding grinding stone b1 while it carries out rotation drive control of the lens axis of rotation 5 based on ball type configuration data (thetai, rhoi) as shown in above-mentioned (E), after it exchanges the KOBA thick configuration measurement tool f for the rough grinding grinding stone b1, as the operation control circuit 102 can be set to above-mentioned (C).

[0066] Then, as the operation control circuit 102 can be set to (C), it exchanges the rough grinding grinding stone b1 for the finish grinding grinding stone c1. An arris is made to form in the periphery section of the processed lens L like drawing 9 (d) by the finish grinding grinding stone c1. Make chamfering-of-the-edge processing of the KOBA edge of the periphery section of the processed lens L perform like drawing 9 (e) and drawing 9 (f) by the finish grinding grinding stone c1, the above-mentioned finish grinding grinding stone c1 is made to desert the processed lens

L, and processing is terminated like drawing 9 (g).
(2) Arris processing polish mode (Bevel Polish MODE)
If arris processing polish mode (Bevel Polish MODE) is chosen with the mode selection switch 107, the operation control circuit 102 will give arris processing and polish processing to the KOBA edge of the processed lens L according to the processing sequence shown in drawing 10 .

[0067] Namely, after doing the work to drawing 9 (a) – (f) in above-mentioned (1) like drawing 10 (a) – (f), it enables it to set to (C). After exchanging the finish grinding grinding stone c1 for the polish grinding stone d1 and grinding the arris of the processed lens L like drawing 10 (g) by the polish grinding stone d1, it enables it to set to (C). After exchanging the polish grinding stone d1 for the super-polish grinding stone e1 and carrying out super-polish finishing of the arris of the processed lens L like drawing 10 (h) by the super-polish grinding stone e1, the super-polish finish of the chamfering-of-the-edge section of the KOBA edge of the periphery section of the processed lens L is made to perform like drawing 10 (i) and (j).
(3) Recessing polish mode (Groove Polish MODE)
If recessing polish mode (Groove Polish MODE) is chosen with the mode selection switch 107, the operation control circuit 102 will give recessing and polish processing to the KOBA end face of the processed lens L according to the processing sequence shown in drawing 11 .
[0068] Namely, after doing the work to drawing 9 (a) – (c) in above-mentioned (1) like drawing 11 (a) – (c), it enables it to set to (C). Exchange the rough grinding grinding stone b1 for the finish grinding grinding stone c2, and common processing finishing of the KOBA end-face perimeter of the processed lens L is carried out like drawing 11 (d) by the finish grinding grinding stone c2. Next, after forming a slot in the KOBA end-face perimeter of the processed lens L like drawing 11 (e) by the finish grinding grinding stone c2, chamfering-of-the-edge processing of the KOBA edge of the periphery section of the processed lens L is made to perform like drawing 11 (f) and drawing 11 (g) by the finish grinding grinding stone c2.
[0069] Then, exchange the finish grinding grinding stone c2 for the polish grinding stone d2, and after grinding the slot formed in the KOBA end face of the processed lens L by the polish grinding stone d2 like drawing 11 (h), it enables it to set to (C), as it can set to (C). After exchanging the polish grinding stone d2 for the super-polish grinding stone e2 and carrying out super-polish finishing of the slot of the KOBA end face of the processed lens L like drawing 11 (i) by the super-polish grinding stone e2, the super-polish finish of the chamfering-of-the-edge section of the KOBA edge of the periphery section of the processed lens L is made to perform like drawing 11 (j) and (k).
(4) If **** processing mode is chosen with the trench-digging processing mode mode selection switch 107, the operation control circuit 102 will perform trench-digging processing for attaching a bridge and a temple in the periphery of the processed lens L while carrying out the grinding process of the periphery of the processed lens L to a ball type configuration according to the processing sequence shown in drawing 12 or drawing 13 .
[0070] Namely, as shown in drawing 12 (a), (b) or drawing 13 (a), and (b), after performing measurement of drawing 9 (a) in above-mentioned (1), and (b), it enables it to set to (C). Exchange the KOBA thick configuration measurement tool f for the trench-digging processing tool b4, and trench-digging processing is carried out for the slot 200 as shown in the periphery section of the processed lens L by drawing 14 and drawing 15 by the point of the trench-digging processing tool b4. Next, the grinding process of the periphery section of the processed lens L is carried out to a ball type configuration by the pars intermedia of the trench-digging processing tool b4. Then, as it can set to (C), exchange the trench-digging processing tool b4 for a drill c3, and punching processing as shown in the slot 200 formed by trench-digging processing of the processed lens L with the drill c3 at drawing 12 (e) and drawing 13 (e) is carried out. As a screwhole 201 is formed in a slot 200 and it can next set to (C), a drill c3 is exchanged for the polish grinding stone d1, and by the pars intermedia of the polish grinding stone d1, as shown in drawing 12 (f) and drawing 13 (f), polish processing is given to th KOBA end face of the processed lens L. By this example, this slot 200 is formed in order to fit in and to attach bending section 202a of the end of a temple 202. the screw insertion which fitted into the slot 200 and

prepared bending section 202a in bending section 202a on the occasion of this installation — a hole — after inserting a screw 203 in 202b, this screw 203 is screwed on the screwhole 201 of a slot 200 By this, a temple 202 will be attached in the processed lens L.
The <2nd example> The display 109 mentioned above is good also as the display screen like drawing 16 which is the so-called panel computer. That is, as shown in drawing 16 , the touch-panel switch section 111 for measurement of the touch-panel switch section 110 for imag display section 109a as which the lens frame pictures LL and LR on either side are displayed, measurement of a left lens, or processing, and a right lens, or processing is formed in the display screen of display 109. This touch-panel switch section 110,111 is formed corresponding to the lens frame pictures LL and LR on either side. Moreover, the display screen of display 109 has the display 113 which brings near in the lens frame geometrical pitch FPD and the pupil distance PD of a right-and-left eye, and displays an amount UP, size (Size), etc. while having the display 112 which corresponds to the frame pictures LL and LR and displays data, such as a curve value (Curve) of a right-and-left lens, and the degree (Angle) of axial angle.
[0071] Furthermore, the display screen of display 109 has the touch-panel switch section 115 for operating a drive motor 23 in order to make the touch-panel switch section 114 and the processed lens L which are used in order to read the following ball type configuration data from the frame configuration measuring device 103 (ball type configuration measuring device) pinch between the lens axis of rotation 5 and the work maintenance shaft 25.
[0072] Moreover, the display screen of display 109 has the touch-panel switch section 116,117,118,119, the touch-panel switch section 120 on which a menu screen is displayed, and the touch-panel switch section 121 which stops operation of a touch-panel switch in order to choose processing modes, such as auto, metal, plastics, and a polish.
[0073] By carrying out touch operation of this touch-panel switch section 116, menus, such as "Auto, Manual, PC, F Change", etc. as shown in drawing 17 , are displayed on the auto (Auto) bottom, and the check mark CM in the mode which is present in the left-hand side of Auto now is displayed. Whenever this check mark CM carries out touch operation of the touch-panel switch section 116, it moves in order of (a) of drawing 18 and drawing 19 , (b), (c), and (d), and the change in the mode is performed.
[0074] Moreover, by carrying out touch operation of the touch-panel switch section 117, menus, such as "Metal, Plastic, Groove, Point", etc. as shown in drawing 21 (a), are displayed on the metal (Metal) bottom, and the check mark CM in the mode which is present in the left-hand side of Metal now is displayed. Whenever this check mark CM carries out touch operation of the touch-panel switch section 117, it moves in order of (a) of drawing 20 and drawing 21 , (b), (c), and (d), and the change in the mode is performed.
[0075] Furthermore, by carrying out touch operation of the touch-panel switch section 118, menus, such as "Plastic, PC, Acril, Mineral", etc. as shown in drawing 23 (a), are displayed on the plastics (Plastic) bottom, and the check mark CM in the mode which is present in the left-hand side of Plastic now is displayed. Whenever this check mark CM carries out touch operation of the touch-panel switch section 118, it moves in order of (a) of drawing 22 and drawing 23 , (b), (c), and (d), and the change in the mode is performed.
[0076] If touch operation of the touch-panel switch section 120 is carried out, as shown in drawing 24 , the menu screen which consists of each panel control units 122, 123, and 124,125,126,127 of "Condition", "Bevel", "Drill", "Safety Bevel", "Polish", and "Grooving" will be displayed on display 109.
[0077] Moreover, the touch-panel switch section 131 (Yes) for performing a setup on the touch-panel switch section 130 (Cancel) for stopping operation by the touch panel on the touch-panel switch section 129 (Next Page) for displaying the touch-panel switch section 128 (Before Page) for returning to a front screen and the next screen and a menu screen and a touch panel is also displayed on this menu screen.
[0078] Here, it is used in order that the panel control unit 122 may set up the temperature of the grinding water (Coolant) for cooling in the case of this example, and "Constant" which holds the temperature uniformly in this drawing is set up. In addition, the setting temperature is changeable by choosing "Cool", in lowering the temperature of grinding water, and choosing

"Hot", in raising.

[0079] The panel control unit 123 is used in order to perform the indicator strain for arris positioning, and a fine-tuning setup of the arris position. Here, "Bevel Control" is a control unit for setting up whether the indicator strain for arris positioning, i.e., data required for arris processing, is somewhere received, or by equipment of what arris processing is controlled, and it has three alternative, "ALE" (lens edger), "ALE/PC" (a lens edger / personal computer terminal), and "PC" (personal computer terminal). If it is set as "ALE", the operation control circuit 102 will receive data required for arris processing only from a lens edger, and will control arris processing based on the processing data. If it is set as "PC", data required for arris processing will be received only from the personal computer terminal which became independent of a lens edger, and arris processing will be controlled based on the processing data. If it is set as "ALE/PC", data required for arris processing will be received from either a lens edger or a personal computer terminal, and arris processing will be controlled based on the processing data. In the example, "ALE/PC" is set up that data required for arris processing should be received from either a lens edger or a personal computer terminal.

[0080] Moreover, "Position" is a control unit for carrying out mark adjustment of the position which carries out arris processing, and it is set up so that an arris mountain position may come to "Rear" (posterior) here.

[0081] The panel control unit 124 is used in order to carry out punching processing so that a rim loess frame can be equipped with the spectacle lens after a grinding process. Here, "Diameter" (diameter) can show the diameter of the hole made in a spectacle lens, and it can set up to what mm the diameter of a hole is set. In the case of this example, the hole of a size with a diameter of 0.8mm is set up. On the other hand, it can specify whether in "Dimension" (dimension), a hole is made from which [of a spectacle lens order side] side (Front or Rear), and "Front" (anterior) is set up in the example.

[0082] The panel control unit 125 is used in order to set up chamfering of the edge of a spectacle lens. "Width" (width of face) can show the width of face of the KOBA side which beveled, and it can be set as 0.2mm, 0.4mm, and 0.6mm here. "Position" (position) can show the position which bevels and "Front" (anterior), "Rear" (posterior), or "Both" (order both) can be set up. "Angle" (angle) can show at an angle of how much it bevels from a KOBA side, when beveling, and it can be set as 45 degrees, 50 degrees, and 55 degrees here. Moreover, in the item of "Special", special chamfering-of-the-edge processing is also realizable for small chamfering of the edge by setting "Standard" to "Small" and the usual chamfering of the edge, and setting "Large" to big chamfering of the edge. "Standard" is set up in the example to perform the usual chamfering-of-the-edge processing.

[0083] The panel control unit 126 is used in order to set up mirror-plane processing of a KOBA side. Here, "Level" is for carrying out to the grade of mirror-plane processing, i.e., coarse mirror-plane processing, making it the usual mirror-plane processing, making it detailed mirror-plane processing, or (Fine) setting up, and, in the case of the example, "Standard" which performs the usual mirror-plane processing is set up. "Bevel" is for setting up the position which gives mirror-plane processing, and, in the case of the example, "Both" which processes the both sides of the anterior (Front) of an arris and a posterior (Rear), i.e., the whole surface of a KOBA side, is set up.

[0084] The panel control unit 127 is used, when giving ditch excavation processing to a KOBA side, in order to equip a wireframe etc. with the spectacle lens after common processing. Here, "Depth" and "Width" are for setting up the depth of flute and width of face which are formed in a KOBA side, respectively, and, in the case of the example, the depth of flute and width of face are set as 1.6mm.

[0085] Each above panel control units 122, 123, and 124,125,126,127 can perform easily a temperature setup of grinding water, a setup of arris processing, a setup of punching processing, a setup of chamfering-of-the-edge processing, a setup of mirror-plane processing, and a setup of **** processing.

[0086] Moreover, in order to simulate in simulation the spectacle lens expected after a setup by the panel control unit mentioned above, and processing, the touch-panel switch section 129 can

be touched, it can change to the simulation screen shown in drawing 25 , and various processing setup can be changed and corrected.
[0087] The simulation display panel 132 displays an arris position in simulation. The arris form displayed here expresses the cross-section configuration of the KOBA side of the spectacle lens after the grinding process in a certain arbitrary radius vectors in simulation, and it is shown into the position of what mm the mountain position of an arris is processed by this simulation display panel from an anterior refracting interface and a posterior refracting interface.
[0088] In order that the simulation display panel 133 may equip a rim loess frame with the spectacle lens after a grinding process, it indicates whether indicate by the simulation and the diameter of the hole to make opens the spectacle lens after making a hole in the spectacle lens from which [of a a number of mm or spectacle lens order side] side (Front or Rear).
[0089] The simulation display panel 134 displays the chamfering-of-the-edge processing back of a spectacle lens in simulation. Here, "Width" shows the width of face of the KOBA side which beveled, and it is displayed as what mm on a screen. An anterior (Front) or a posterior (Rear) is shown, and the position which "Position" bevels is a line with the thick chamfering-of-the-edge section, changes a color, or is displayed by blink etc. Furthermore, "Angle" shows at an angle of how much it bevels from a KOBA side, when beveling, and an angle is displayed as what degree after a setup of "Position."
[0090] It indicates whether the simulation display panel 135 carries out mirror-plane processing of any of an anterior (FrontBevel), a posterior (Rear Bevel), or the whole surface among KOBA end faces. For example, when carrying out mirror-plane processing of the KOBA side of an anterior (Front Bevel), are expressed as a dotted line, or change a color and it is displayed, or the KOBA side of an anterior (Front Bevel) blinks and is displayed.
[0091] The simulation display panel 136 carries out the simulation of the spectacle lens after performing ditch excavation processing used for a wireframe etc. The width of face (Width) of the slot formed in a KOBA side in order to equip the spectacle lens after processing a wire is displayed as what mm, and the depth of flute (Depth) is displayed as what mm.
[0092] In addition, although the operation screen for a processing setup (drawing 24) and the operation screen (drawing 25) which simulates the spectacle lens after processing are divided in the above-mentioned example, a processing setup can also be performed only on the operation screen which simulates the spectacle lens after processing.
[0093] In such a case, in drawing 25 , 132 becomes a panel control unit for carrying out the setting directions of the arris position. The arris form displayed here expresses the cross-section configuration of the KOBA side of the spectacle lens after the grinding process in a certain arbitrary radius vectors in simulation, and can set the mountain position of an arris as the position of what mm from an anterior refracting interface by this panel control unit.
[0094] 133 becomes a panel control unit for setting up to what mm the diameter of the hole to make is set, or whether a hole is made from which [of a spectacle lens order side] side (Front or Rear), in order to do the work which makes a hole in a spectacle lens so that a rim loess frame can be equipped with the spectacle lens after a grinding process.
[0095] 134 becomes a panel control unit for setting up chamfering of the edge of a spectacle lens. Here, "Width" (width of face) can show the width of face of the KOBA side which beveled, and it can set up by carrying out a close mosquito to what mm on a screen. In "Position" (position), if the position which bevels can set up an anterior (Front) or a posterior (Rear) and sets up, it will be a line with the thick chamfering-of-the-edge section, a color will be changed, or it will be displayed by blink etc. Furthermore, "Angle" (angle) can show at an angle of how much it bevels from a KOBA side, when beveling, and it can set up by inputting an angle as what degree after a setup of "Position."
[0096] 135 becomes a panel control unit for setting up whether mirror-plane processing of any of an anterior (Front Bevel), a posterior (RearBevel), or the whole surface is carried out among KOBA end faces. For example, when carrying out mirror-plane processing of the KOBA side of an anterior (Front Bevel), are expressed as a dotted line, or change a color and it is displayed, or the KOBA side of an anterior (Front Bevel) blinks and is displayed.
[0097] 136 becomes a panel control unit for setting up ditch excavation processing used for a

wireframe etc. It can set up by inputting the width of face (Width) of the slot formed in a KOBA side in order to equip the spectacle lens after processing a wire as what mm, and inputting the depth of flute (Depth) as what mm.
The <3rd example> In this example, the umbrella-like lid is being fixed to the case 1 and bearing is prepared between an umbrella-like lid and the lens axis of rotation 5. Drawing 29 shows the example, the umbrella-like lid 137 which was united with the cylinder-like side attachment wall is fixed to bottom wall 2', bearing 138 is formed between the umbrella-like lid 137 and the lens axis of rotation 5, and opening 137a of the umbrella-like lid 137 is always in the regular position irrespective of the rotation position of the base board 8. For this reason, notch 10c and engagement pin 65b which were prepared in the 1st example are unnecessary, and can also simplify the motion control under tool exchange.
[0098] The exhaust port 139 for grinding water eccrisis is formed in bottom wall 2', a hose 140 is connected to this exhaust port 139, and the waste fluid under grinding process is discharged through these outside. In addition, near the exhaust port 139 of bottom wall 2' has become depressed from the circumference so that the waste fluid may tend to gather for an exhaust port 139.
[0099] Drawing 30 shows other examples of this example, the umbrella-like lid 141 is fixed to a side attachment wall 3 and 3', bearing 138 is formed between the umbrella-like lid 141 and the lens axis of rotation 5, and opening 141a of the umbrella-like lid 141 is always in the regular position irrespective of the rotation position of the base board 8. For this reason, the motion control under tool exchange can be simplified like what was shown in drawing 29 .
[0100] The hose 142 for drainage penetrates to a bottom wall 2, and curved-surface composition of the umbrella-like lid 141 is carried out so that the waste fluid under grinding process may flow into the hose 142.
<4th example> raw spectacle lens L must equip with the adhesive disk of the exclusive use which suited the configuration of a crab eye lens case [like for example, the crab eye lens], and the adhesive disk receptacle for receiving the adhesive disk must be attached in the lens axis of rotation. Then, in this example, the portion in which an adhesive disk is attached among the lens axes of rotation is prepared with another object as an adhesive disk receptacle fixture, sets this adhesive disk receptacle fixture by the lens configuration, and makes exchange possible.
[0101] Drawing 31 shows the whole lens grinding process equipment composition concerning this example. This equipment is equipped with the tool magazine 6 and the adhesive disk receptacle fixture magazine 143 which has the same composition, and the adhesive disk receptacle fixture 144,145,146 for the usual object for lenses, the object for crab eye lenses, and major-diameter lenses is held in the adhesive disk receptacle fixture magazine 143 here. As the adhesive disk receptacle fixture 144,145,146 is equipped with the top adhesive disk receptacle fixtures 144a, 145a, and 146a and the bottom adhesive disk receptacle fixtures 144b, 145b, and 146b, respectively and shows them to drawing 32 For example, the adhesive disk receptacle fixture 144 is in the state with which 144d of L character-like slots established in pin 144c and bottom adhesive disk receptacle fixture 144b which were prepared in top adhesive disk receptacle fixture 144a engaged and was united, and is held in the adhesive disk receptacle fixture magazine 143. Moreover, the portion made of rubber of top adhesive disk receptacle fixture 144a which contacts the posterior refracting interface of the processed lens L 144f in the body of bottom adhesive disk receptacle fixture 144b in which, as for 144e, the fitting slot was formed is shown among this drawing, and it is similarly constituted by the adhesive disk receptacle fixture 145,146.
[0102] The fitting pin 147 which fits into these fitting slots is formed in lens axis-of-rotation 5' so that it can equip with all of the bottom adhesive disk receptacle fixtures 144b, 145b, and 146b. The lens clamp equipment 148 drive control is carried out [equipment] by the operation control circuit 102 is formed in the case side attachment wall. Unlike the lens clamp equipment 20 in the 1st example, this lens clamp equipment 148 can bound, can serve as a raising formula, and can permit now movement to right above [of lens axis-of-rotation 5' of a clamp tool]. The top adhesive disk receptacle fixture which could hold the arm point of lens clamp equipment 148 free [rotation of the top adhesive disk receptacle fixtures 144a, 145a, and 146a], and was held

free [rotation] in this way plays the role of an alternative of the lens axis of rotation 25 in the 1st example. In addition, 149 is a spring, and it is prepared in order to prevent rapid drive movement of lens clamp equipment 148.

[0103] With the lens grinding process equipment concerning this example, a clamp tool chooses the adhesive disk receptacle fixture suitable for the lens configuration of a processed lens from the adhesive disk receptacle fixture magazine 143, pinches the top adhesive disk receptacle fixture according to the tool maintenance mechanism 60, and carries to right above [of lens axis-of-rotation 5']. And the pinched adhesive disk receptacle fixture is dropped and lens axis-of-rotation 5' is made to equip with a bottom adhesive disk receptacle fixture so that the fitting slot of the bottom adhesive disk receptacle fixture may engage with the fitting pin 147. Furthermore, after rotating a top adhesive disk receptacle fixture with the tool rotation drive 50 and making engagement into a pin (144c, 145c, 146c) and a L character-like slot (144d, 145d, 146d) cancel, pinching of a top adhesive disk receptacle fixture is released, and it evacuates from on lens axis-of-rotation 5'.

[0104] Then, it goes up again, descending, as the lens clamp equipment 148 which suited the state where it had bounded shows with the chain line, holding a top adhesive disk receptacle fixture by the point, and holding this top adhesive disk receptacle fixture, and this is made to separate from a bottom adhesive disk receptacle fixture. In this state, an operator attaches in a bottom adhesive disk receptacle fixture the processed lens to which the adhesive disk (adsorption cup) stuck by making an adhesive disk into facing down, and the clamp of a lens completes him by pressing down this processed lens from the upper part by lens clamp equipment 148 through a top adhesive disk receptacle fixture.

[0105] Henceforth, what is necessary is to pick out a new adhesive disk receptacle fixture from the adhesive disk receptacle fixture magazine 143, and just to repeat the same procedure as the above, after removing an adhesive disk receptacle fixture from lens axis-of-rotation 5' according to work contrary to the above-mentioned attachment procedure and holding this in the adhesive disk receptacle fixture magazine 143, in exchanging the kind of adhesive disk receptacle fixture, in order to change the kind of processed lens, although processing work advances as mentioned already in the 1st example.

[0106]

[Effect of the Invention] Since it can respond by the wheel spindle of only one shaft and one is sufficient also for the driving gear of a grinding stone with the above, without preparing a new wheel spindle corresponding to the lens quality of the materials, such as various processing classification, and glass or plastics, a drive and the whole equipment can be simplified.

[0107] Moreover, as well as the above when performing the grinding process of a spectacle lens corresponding to a frame with special rim loess frame in recent years, wireframe, etc., it is only sufficient to exchange tools by the tool maintenance axis of rotation, and it is not necessary to arrange a new wheel spindle separately.

[0108] Since the drive of the tool maintenance axis of rotation and the drive of an installation base are considered as common use, equipment can be miniaturized and it can simplify.

[0109] It has the effect that the good arris grinding process of the appearance corresponding to the configuration of a KOBA side is realizable by moreover arranging the KOBA thick configuration measurement tool which was not in conventional lens grinding process equipment.

[Translation done.]

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the whole lens grinding process equipment explanatory drawing concerning this invention.
[Drawing 2] The enlarged view at the time of according [(c)] to tool maintenance mechanism tool according [the enlarged view at the time of tool maintenance according / (a) / to the tool maintenance mechanism of drawing 1 and (b)] to right lateral view of (a) maintenance release and (d) are the right lateral views of (c).
[Drawing 3] It is explanatory drawing of the tool made to hold in the tool maintenance mechanism of drawing 1 .
[Drawing 4] Explanatory drawing for tool exchange and (c of (a) and (b)) are explanatory drawings for KOBA thick measurement of a **-ed lens.
[Drawing 5] It is explanatory drawing showing the relation between the tool attaching part of drawing 1 , and a tool.
[Drawing 6] It is operation explanatory drawing showing the busy condition of the KOBA thick configuration measurement tool of drawing 3 .
[Drawing 7] It is operation explanatory drawing showing the busy condition of the rough grinding grinding stone of drawing 3 .
[Drawing 8] It is the control circuit view of the lens grinding process equipment of drawing 1 .
[Drawing 9] It is explanatory drawing showing an example of the processing sequence by the lens grinding process equipment concerning this invention.
[Drawing 10] It is explanatory drawing showing an example of the processing sequence by the lens grinding process equipment concerning this invention.
[Drawing 11] It is explanatory drawing showing an example of the processing sequence by the lens grinding process equipment concerning this invention.
[Drawing 12] It is explanatory drawing showing an example of the processing sequence by the lens grinding process equipment concerning this invention.
[Drawing 13] It is explanatory drawing showing an example of the processing sequence by the lens grinding process equipment concerning this invention.
[Drawing 14] It is the partial perspective diagram showing the relation between a processed lens and a temple.
[Drawing 15] It is the plan of the processed lens of drawing 14 .
[Drawing 16] It is explanatory drawing showing an example of the display screen of the display used for the lens grinding process equipment of this invention.
[Drawing 17] It is partial explanatory drawing when operating a part of display screen of drawing 16 .
[Drawing 18] It is explanatory drawing of the menu selection cycle by operation of the touch-panel switch section of drawing 16 .
[Drawing 19] It is explanatory drawing of the selection menu accompanying the menu selection cycle of drawing 18 .
[Drawing 20] It is explanatory drawing of the menu selection cycle by operation of the touch-panel switch section of drawing 16 .

[Drawing 21] It is explanatory drawing of the selection menu accompanying the menu selection cycle of drawing 20 .
[Drawing 22] It is explanatory drawing of the menu selection cycle by operation of the touch-panel switch section of drawing 16 .
[Drawing 23] It is explanatory drawing of the selection menu accompanying the menu selection cycle of drawing 22 .
[Drawing 24] It is explanatory drawing showing an example (menu screen) of the display screen of the display used for the lens grinding process equipment of this invention.
[Drawing 25] It is explanatory drawing showing an example (simulation screen) of the display screen of the display used for the lens grinding process equipment of this invention.
[Drawing 26] (a) The plan of the covering device material prepared in opening of an umbrella-like lid and (b) show the side elevation of the covering device material of (a).
[Drawing 27] It is explanatory drawing showing the state where the adhesive disk was attached on a processed lens.
[Drawing 28] It is explanatory drawing showing the state where the processed lens of drawing 27 was installed in the lens axis of rotation.
[Drawing 29] It is explanatory drawing showing the modification of the lens grinding process equipment of drawing 1 .
[Drawing 30] It is explanatory drawing showing the modification of the lens grinding process equipment of drawing 1 .
[Drawing 31] It is explanatory drawing showing the modification of the lens grinding process equipment of drawing 1 .
[Drawing 32] Explanatory drawing showing the state where the top adhesive disk receptacle fixture and the bottom adhesive disk receptacle fixture separated (a), and (b) are explanatory drawings showing the state where the top adhesive disk receptacle fixture and the bottom adhesive disk receptacle fixture were engaged.
[Description of Notations]
L ... Processed lens (raw spectacle lens)
b1 ... Rough grinding grinding stone (grinding-stone tool for rough grinding)
b2 ... Rough grinding cutter (grinding-stone tool for rough grinding)
c1 ... Finish grinding grinding stone (**** tool for finish grinding)
c2 ... Finish grinding grinding stone (the **** tool for finish grinding, cutter)
c3 ... Drill (tool for punching)
c4 ... Finish grinding grinding stone (the **** tool for finish grinding, grinding-stone tool for chamfering-of-the-edge processing)
d1 ... Polish grinding stone (grinding-stone tool for mirror-plane processing)
d2 ... Polish grinding stone (the grinding-stone tool for mirror-plane processing, cutter)
e1 ... Super-polish grinding stone (the grinding-stone tool for super-mirror-plane processing, grinding-stone tool for superfinishing grinding)
e2 ... Super-polish grinding stone (the grinding-stone tool for super-mirror-plane processing, the grinding-stone tool for superfinishing grinding, cutter)
5 25 ... Lens axis of rotation
8 ... Base board (installation base)
f ... KOBA thick configuration measurement tool

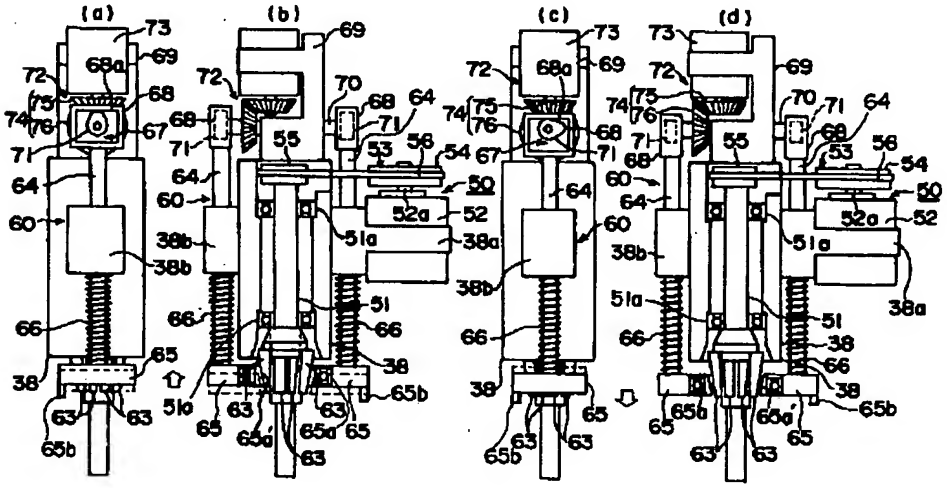
[Translation done.]

* NOTICES *

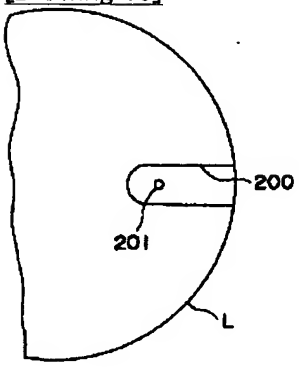
1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DRAWINGS

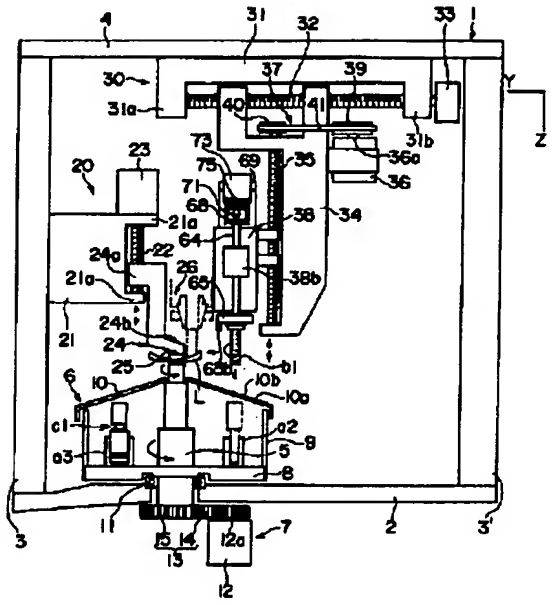
[Drawing 2]



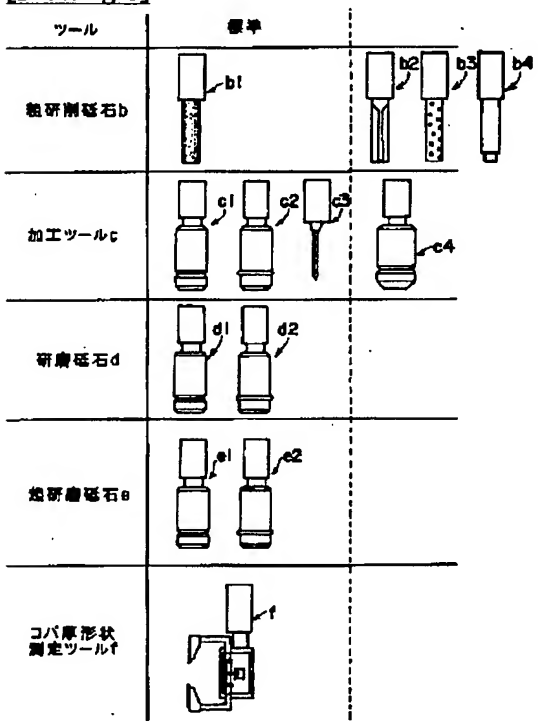
[Drawing 15]



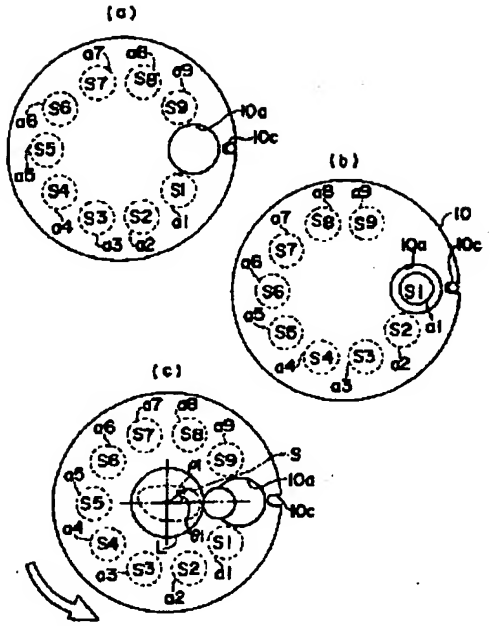
[Drawing 1]



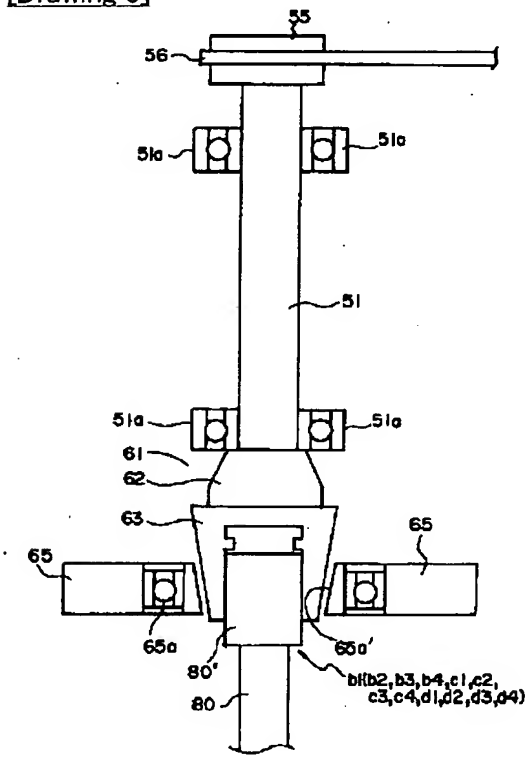
[Drawing 3]



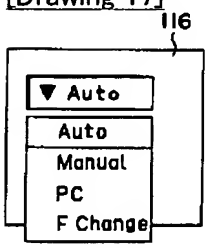
[Drawing 4]



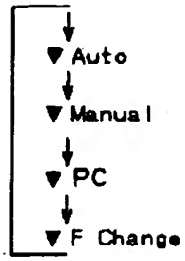
[Drawing 5]



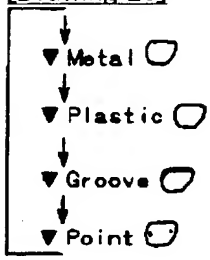
[Drawing 17]



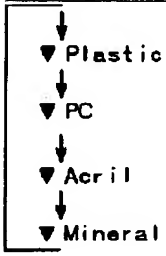
[Drawing 18]



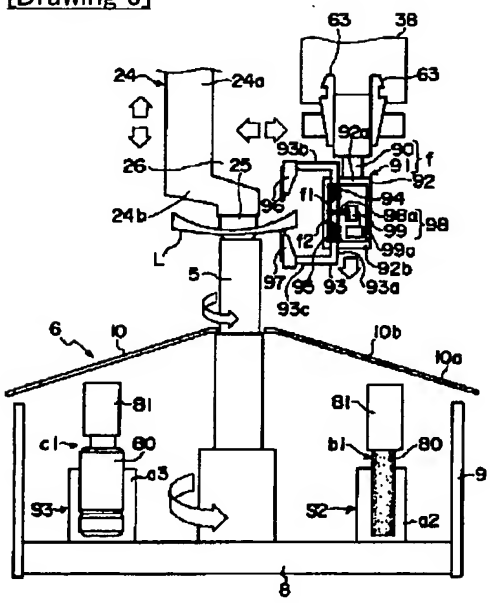
[Drawing 20]



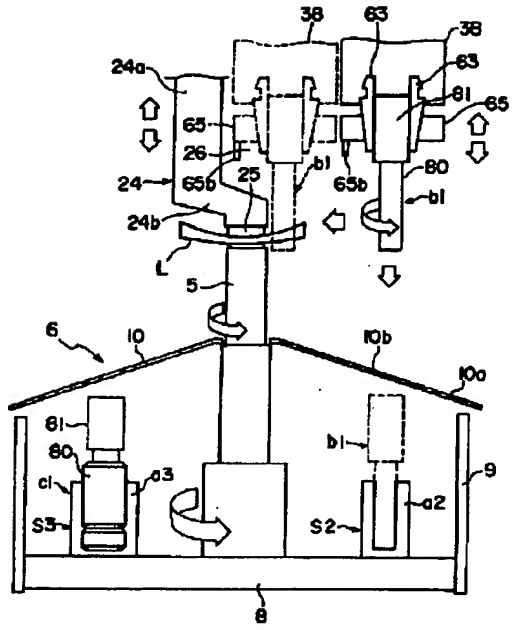
[Drawing 22]



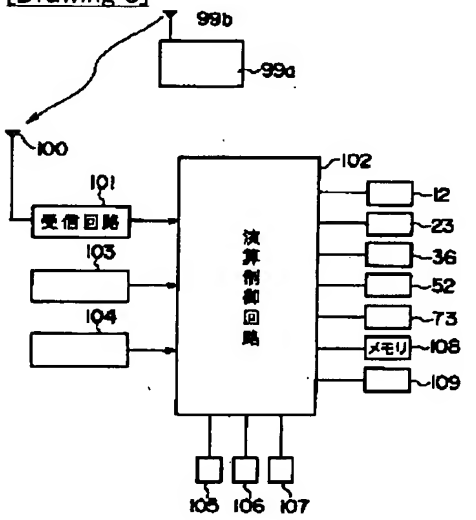
[Drawing 6]



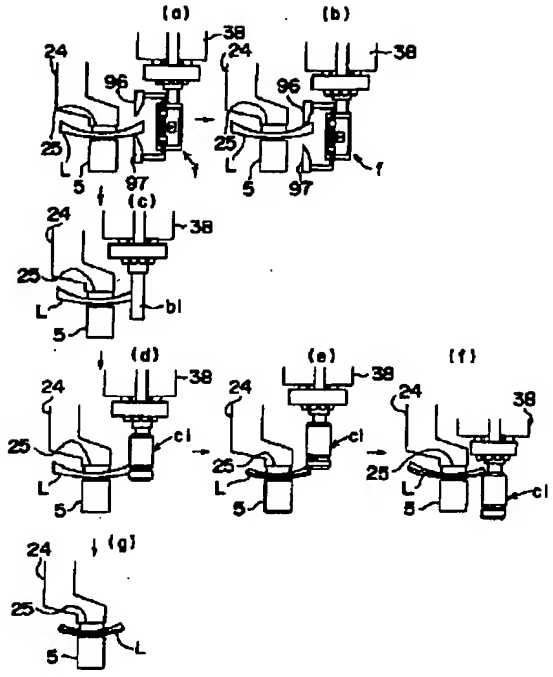
[Drawing 7]



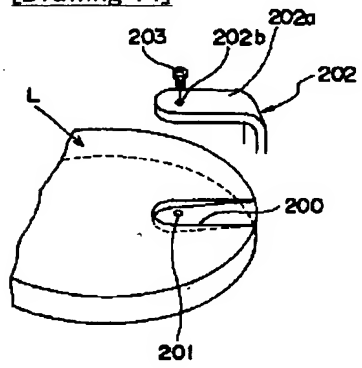
[Drawing 8]



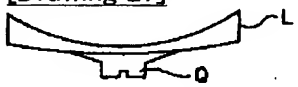
[Drawing 9]



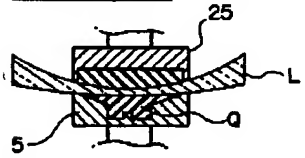
[Drawing 14]



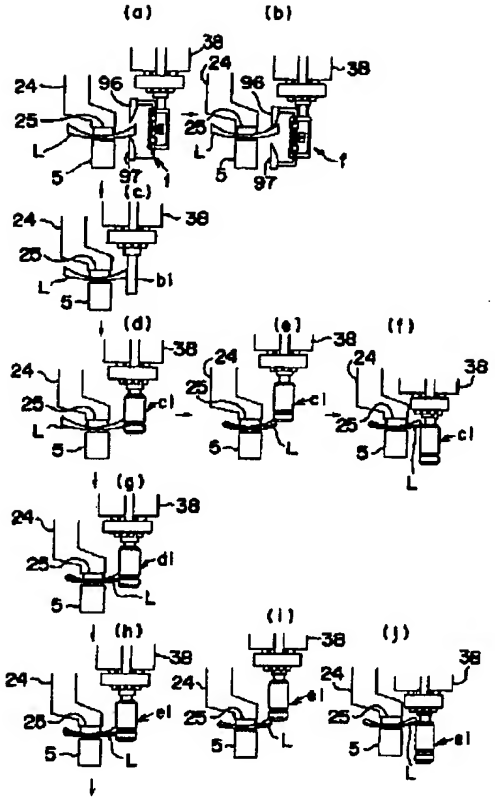
[Drawing 27]



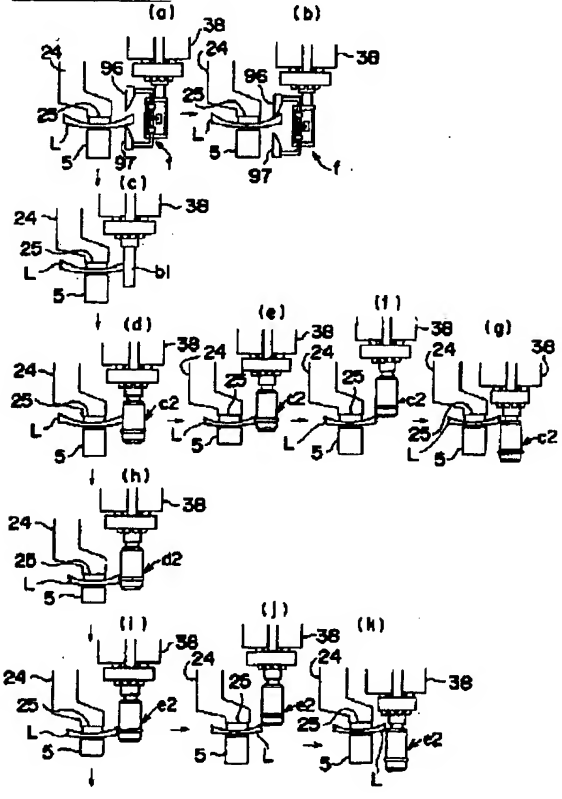
[Drawing 28]



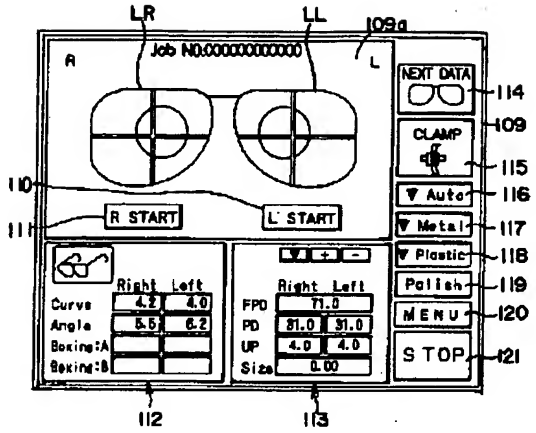
[Drawing 10]



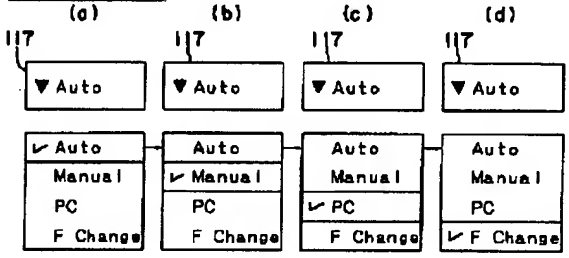
[Drawing 11]



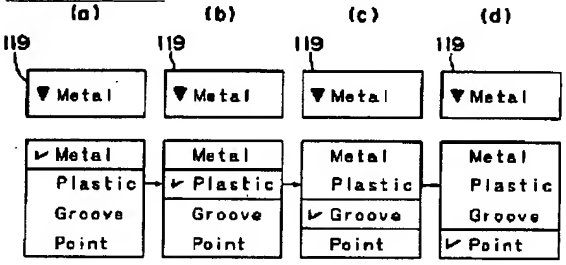
[Drawing 16]



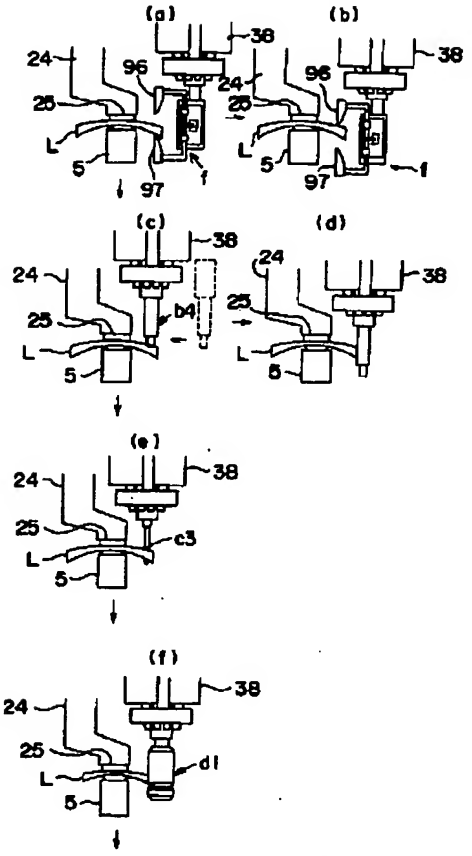
[Drawing 19]



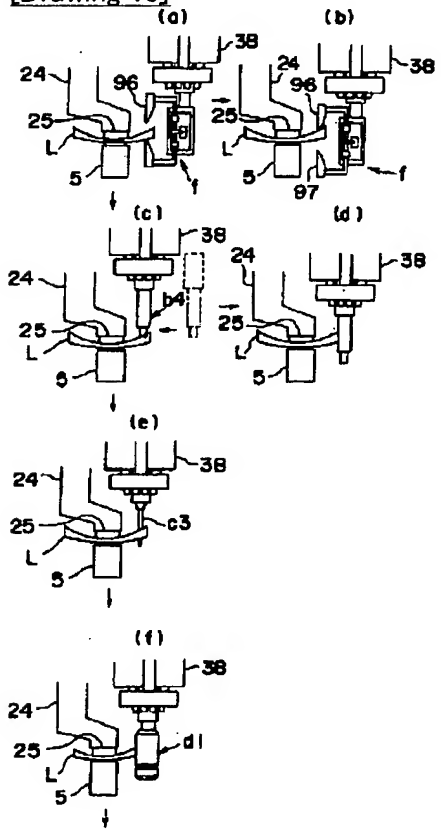
[Drawing 21]



[Drawing 12]

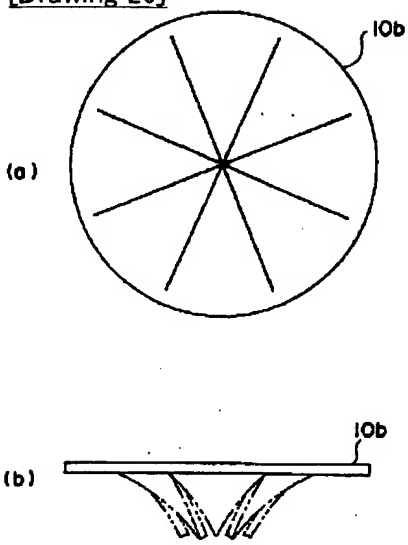


[Drawing 13]

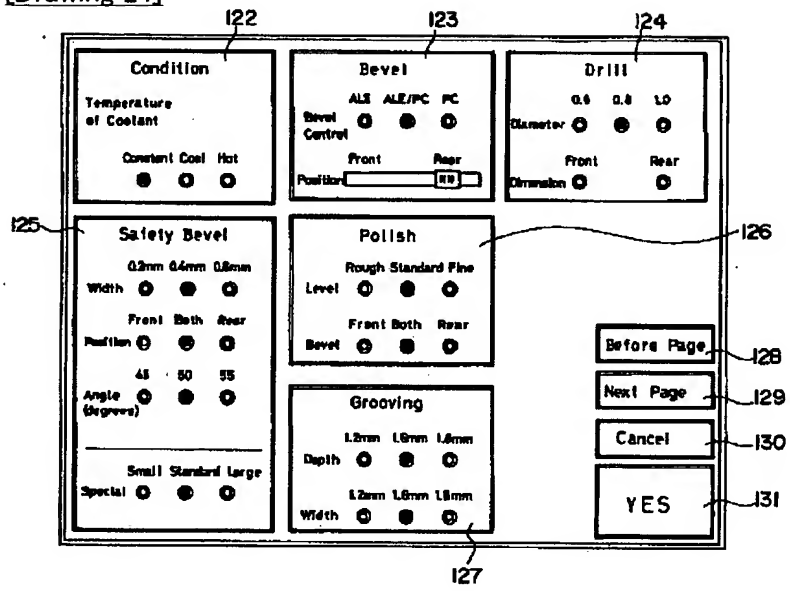


[Drawing 23]

[Drawing 26]



[Drawing 24]



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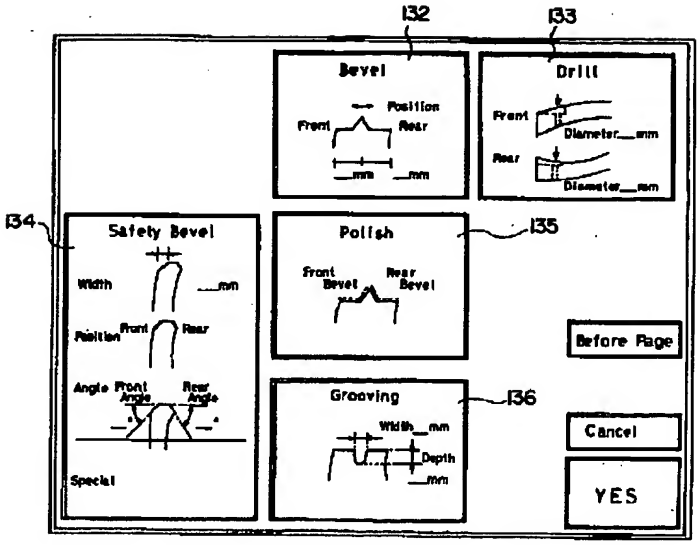
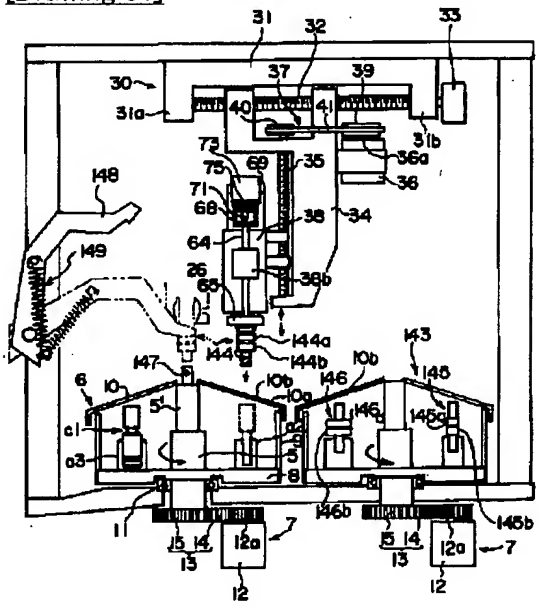
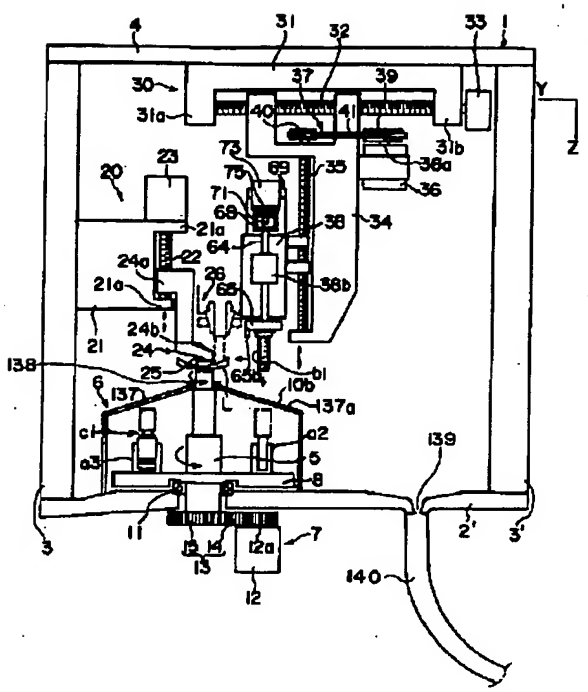


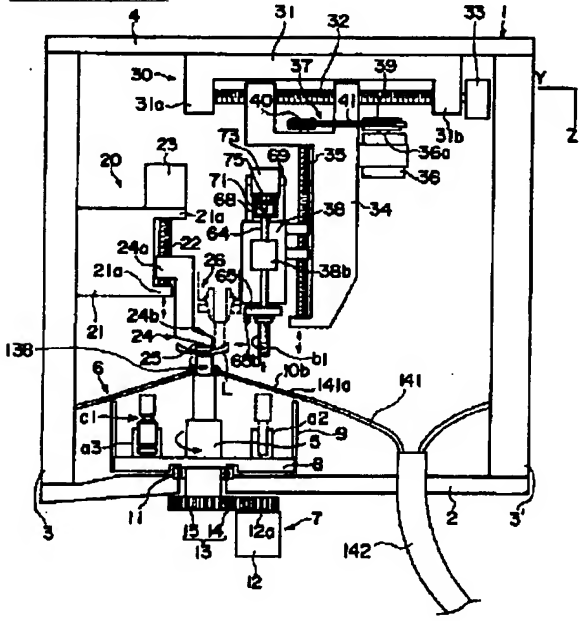
[Drawing 31]



[Drawing 29]

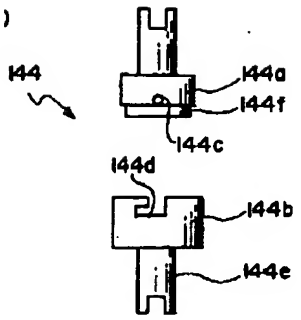


[Drawing 30]

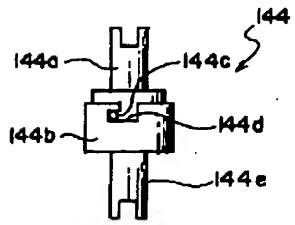


[Drawing 32]

(a)



(b)



[Translation done.]